Natural vegetation of the Carolinas:
Classification and description of
Mesic-hydric plant communities north of the Albemarle Sound, North Carolina

A report prepared for the Ecosystem Enhancement Program, North Carolina Department of Environment and Natural Resources in partial fulfillments of contract D07042.

By M. Forbes Boyle, Robert K. Peet, Thomas R. Wentworth, and Michael P. Schafale

Carolina Vegetation Survey
Curriculum in Ecology, CB#3275
University of North Carolina
Chapel Hill, NC 27599-3275

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INTRODUCTION

In terms of natural plant community composition, the coastal fringe area north of Albemarle Sound is a particular unusual and little documented region of North Carolina. The marshes here are primarily freshwater and the landscape is one of the embayed drainage basins, in part reflecting the rapid subsidence of land in this region. In spite of a general awareness of these wetland communities, there had not been any previous vigorous assessment of their composition and structure. Knowledge of the vegetation composition and structure of these communities can inform management decisions and direct future restoration projects.

In July 2006, the Carolina Vegetation Survey conducted an initial floristic inventory of natural communities within the wetlands north of Albemarle Sound, North Carolina. The objectives of the study were to define and characterize the mesic to hydric vegetation of this poorly described area. Furthermore, the data captured from these plots will enable us to refine the community classification within the broader region. The goal of this report is to determine a classification structure based on the synthesis of vegetation data obtained from the July 2006 plots.

STUDY AREA AND FIELD METHODS

During July 2006, a total of 52 vegetation plots were established in the far northeastern portion of North Carolina (Figure 1). Focus locations within the study area included the Chowan River, North River, Northwest River, the Great Dismal Swamp, Currituck Sound, Coinjock Bay, Knott's Island Bay, and Merchant's Millpond. Target natural communities included Tidal Freshwater Marsh, Tidal Cypress-Gum Swamp, Nonriverine Swamp Forest, Nonriverine Wet Hardwood Forest, Mixed Mesic Hardwood Forest, Estuarine Fringe Pine Forest, Peatland Atlantic White Cedar Forest, High Pocosin, Small Depression Pocossin, Pond Pine Woodland, Coastal Plain Small Stream Swamp, Coastal Plain Bottomland Hardwoods, and Coastal Plain Levee Forests.

Vegetation was sampled following the North Carolina Vegetation Survey protocol described in Peet et al. (1998), and data collected conformed to established and proposed federal standards (see: Jennings et al. 2007, and Federal Geographic Data Committee 2007) http://www.fgdc.gov/standards/projects/FGDC-standards-projects/vegetation/index_html). Plots were subjectively located to best capture the composition of the target plant community. Each plot contained from 1 to 10 100 m^2 modules, the number reflecting the area of visually homogeneous vegetation available to sample. Species presence was recorded across a logarithmic sequence of subplot sizes including 0.01, 0.1, 1, 10, 100, and where sufficient modules were sampled 400 and 1000 m^2. Species cover was recorded individually for up to 4 intensively sampled modules (those containing the nested subplots), and overall cover for the plot was also recorded for species not found in intensively sampled modules. Soil samples were collected and sent to Brookside Laboratories for analysis. Soil nutrients were extracted by the Mehlich III technique. Mean soil nutrient and texture values are summarized by community in Appendix 1. Tree stems were recorded for each plot by diameter.

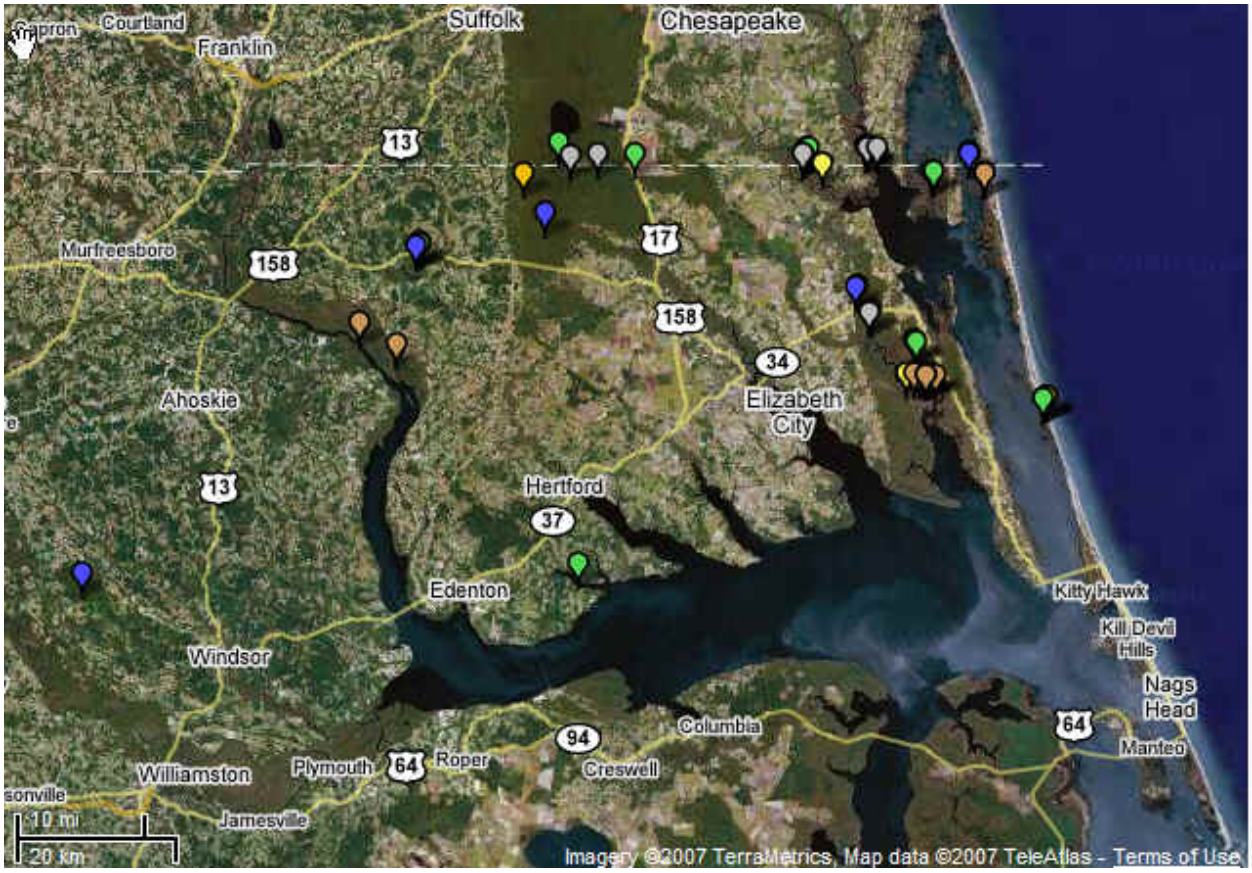


FIGURE 1. Pulse 2006b sample region and established plots: Chowan, Perquiman's , Little, and North River drainage. (Map courtesy of VegBank: http://vegbank.org/vegbank/views/map_userplots.jsp?latlongfile=http://www.bio.unc.edu/faculty/peet/lab/CVS/maps/76-points.csv)

VEGETATION CLASSIFICATION

Plots were classified to association following the US National Vegetation Classification (NVC) standard (Grossman et al. 1998, Jennings et al. 2006) and the Carolina Vegetation Survey's "Vegetation of the Carolinas" project (http://cvs.bio.unc.edu/vegetation.htm). The 'association' is defined as a group of plots having similar species composition, structure, and habitat. Plot assignment was accomplished through a qualitative assessment of vegetation composition, landscape position, hydrologic regime, and soil characteristics. The associations were grouped into higher categories following the classification hierarchy developed by the "Vegetation of the Carolinas" project and include the Formation (e.g., Coastal Plain lowland evergreen forests and shrublands) and Ecological Group (e.g., White cedar forests) levels. The lowest, finest level of the classification scheme used was the NVC association.

Where possible, plots were assigned to an NVC association, identified by association name and unique CEGL identifier. Also, a degree of fit was applied to the classification scheme based on the plot's correspondence with its assigned association. The 5-level scale of fit we employ conforms to that the standards employed by the VegBank archive and the proposed US Federal standards (see Jennings et al. 2007): Excellent, Good, Fair, Poor (similar but wrong), and Bad (unambiguously wrong). In some cases it was necessary to assign a plot to more than one community because of its intermediate character. In 34 of the 52 cases (see Appendix 2), the fit was either fair or poor, suggesting a need for numerous revisions of the NVC to better represent the vegetation of this part of North Carolina.

For each community type to which we assigned plots, we provide a brief summery. We also provide hotlinks (with the CEGL codes) to the formal descriptions of these types in the National Vegetation Classification. Where the fit is weak or poor, we briefly explain the problem. Composition is shown in detail in Appendix 3 where the prevalent species (most frequent species with the number equal to the average number of species per 100 m^2 plot) are listed by constancy among plots, and mean percent cover where present. Average cover class was calculated using the geometric mean of the true cover range for each cover class. Vegetation that was novel or failed to fit well in established associations of the National Vegetation Classification are summarized in Appendix 2. Botanical nomenclature follows Weakley 2006.

Our classification yielded assignments to 28 high-order community associations, from 16 Ecological Groups and 11 Formations. A community characterization is presented for each association below. Names are based on the naming system used in the U.S. National Vegetation Classification (NatureServe 2007). Names reflect species with high constancy and high cover; a "-" separates species within the same vertical strata, while a "/" separates species of different strata.

ASSOCIATIONS

I. Coastal Plain mixed mesic forests

A. Eutrophic Mesic Forests

1) *Fagus grandifolia* - *Quercus–alba* - (*Acer barbatum*) / Mixed Herbs Forest (CEGL007206)

NVC Fit = Medium Plots = 076-02-1030

This vegetation type is dominated by a closed canopy of both *Fagus grandifolia var. caroliniana* and *Quercus alba*. Other trees found in this plot include *Oxydendrum arboreum*, *Quercus falcata*, *Liquidambar styraciflua*, and *Ilex opaca var. opaca*. A moderately diverse herbaceous stratum includes *Andropogon glomeratus, Chasmanthium laxum*, *Hexastylis arifolia* var. *arifolia*, and *Dichanthelium commutatum* vars. *ashei* and *commutatum*. The NVC recognizes the need for a better definition of this community type, including its relationship with other eutrophic mesic forests of the Atlantic Coastal Plain.

B. Mesotrophic Mesic Forests

1) *Fagus grandifolia - Liriodendron tulipifera* / *Euonymus americana* / *Athyrium filix-femina* ssp. *asplenioides* Forest (CEGL007201)

NVC Fit = Good Plots = 076-02-1028

This mesic forest type includes a canopy of *Fagus grandifolia var. caroliniana*, *Liriodendron tulipifera*, and *Acer rubrum var. rubrum*, with a subcanopy of *Oxydendrum arboretum*, *Carya alba*, and *Ilex opaca var. opaca*. Important herbs include *Euonymus americana*, *Chasmanthium laxum*, *Woodwardia areolata*, *Thelypteris noveboracensis,* and *Mitchella repens*. Shrubs and vines found in this community include *Smilax rotundifolia*, *Gelsemium sempervirens, Vitis rotundifolia*, *Parthenocissus quinquefolia,* and *Vaccinium palidum*. By definition, these mesic forests are less productive than eutrophic mesic forests.

2) *Fagus grandifolia - Quercus–nigra* Forest (CEGL007211)

NVC Fit = Medium Plots = 076-01-1026

Similar in structure and composition as the *Fagus grandifolia - Quercus–nigra* Forest (CEGL007211), this vegetation type is also dominated by *Fagus grandifolia var. caroliniana* in the canopy. However, a stronger oak component here sets these two communities apart. Both *Quercus alba* and *Quercus michauxii* are found in this plot. However, lacking is the co-dominance of *Quercus nigra* which defines this community within NVC.

II. Coastal Plain cultural / successional / exotic upland forests

A. Successional Conifer Forests

1) *Pinus taeda - Liquida–bar styraciflua* Semi-natural Forest (CEGL008462)

NVC Fit = Good Plots = 076-04-1032

An early to mid-successional vegetation type dominated by stems of *Pinus taeda, Liquidambar styraciflua*, and *Quercus michauxii.* Other woody dominants include *Q. hemisphaerica, Q. laurifolia, Carpinus caroliniana var. caroliniana,* and *Acer rubrum var. rubrum.* Scattered throughout are vines (e.g. *Toxicodendron radicans var. radicans, Smilax glauca, Smilax rotundifolia,* and *Vitis vulpina*) and Ericaceous shrubs (e.g. *Vaccinium formosum, Vaccinium fuscatum, Vaccinium pallidum,* and *Gaylussacia frondosa*).

III. Coastal Plain brownwater river forests

A. Brown-water swamp forests

1) *Nyssa aquatic* Forest (CEGL002419)

NVC Fit = Good Plots = 076-02-1029, 076-03-1024

This community occurs on semipermanently flooded low, wet flats of brownwater river systems of the Atlantic Coastal Plain. The vegetation is dominated by a nearly pure canopy of *Nyssa aquatic*, occurring with lesser amounts of *Taxodium distichum, Liquidambar styraciflua, Nyssa biflora,* and *Acer rubrum var. trilobum*. Ground cover and floating vegetation varies in these forests and is dependent on the duration and seasonality of flood waters. Some typical species include *Saururus cernuus*,

Toxicodendron radicans var. radicans, *Persicaria maculosa, Fraxinus caroliniana*, *Sparganium americanum*, *Lemna minor, Woodwardia areolata*, and *Woodwardia virginica.*

IV. Coastal Plain blackwater river forests

A. Black-water Swamp Forests

1) *Taxodium distichum – Nyssa biflora / Fraxinus caroliniana / Lyonia lucida* Forest (CEGL004733)

NVC Fit = Medium Plots = 076-04-1022

This swamp forest community is influenced by river overbank flow brought on by wind tides during certain times of the year. Standing water can collect in these flat, backswamps causing longer periods of soil saturation. Representative tree species include *Taxodium distichum, Nyssa biflora, Fraxinus caroliniana, Acer rubrum var. rubrum,* and *Liquidambar styraciflua*. Community composition in this plot reveals an intergrade between tidal flood swamps and blackwater forests of more inland rivers.

V. Coastal Plain lowland deciduous forests

A. Coastal Plain Hardwood Flats

1) *Quercus michauxii – Quercus pagoda / Clethra alnifolia – Leucothoe axillaris* Forest (CEGL007449)

NVC Fit = Good Plots = 076-01-1023, 076-01-1030

This community occurs on seasonally to nearly permanently saturated flats over mineral soils characterized with having a high water table. Canopy dominants include *Quercus mixauxii*, *Quercus laurifolia*, *Quercus pagoda*, *Liquidambar styraciflua,*

Liriodendron tulipifera, *Acer rubrum*, and *Fraxinus pennsylvanica*. Subcanopy trees include *Carpinus caroliniana* var. *caroliniana* and *Ilex opaca var. opaca*. A dense shrub stratum is composed of *Arundinaria tecta* and *Vaccinium fuscatum*. Herbs found in this community are diverse and can include *Dichanthelium dichotomum var. ramulosum*, *Woowardia areolata*, *Thelypteris noveboracensis*, and *Carex laxiflora*.

B. Coastal Plain Nonriverine Swamp Forests

1) *Nyssa biflora – Liquidambar styraciflua – Acer rubrum var. trilobum / Clethra alnifolia* Forest (CEGL004679)

NVC Fit = Good Plots = 076-02-1025

This nonriverine swamp forest is dominated by a canopy of *Nyysa biflora* and *Acer rubrum var. trilobum* with a lesser extent of *Pinus taeda* and *Liquidambar styraciflua*. The subcanopy is composed of *Ilex opaca var. opaca* and *Magnolia virginiana var. virginiana*. Shrubs that are characteristic of this community type include *Clethra alnifolia, Persea palustris, Asimina triloba,* and *Vaccinium fuscatum*. The herbaceous layer in this community is sparse, but includes *Osmunda cinnamomea, Osmunda regalis var. spectabilis* and *Woodwardia virginica*.

2) *Taxodium distichum – Nyssa biflora / Berchemia scandens – Toxicodendron radicans / Woodwardia areolata* Forest (CEGL004429)

NVC Fit = Good Plots = 076-01-1028

This nonriverine swamp forest is dominated by a canopy of *Nyssa biflora, Taxodium distichum,* and *Acer rubrum var. trilobum* with a subcanopy of *Ilex opaca var. opaca*. Woody vines are common in this community type, with those that dominate including *Toxicodendron radicans var. radicans, Vitis rotundifolia, Smilax rotundifolia,* and *Decumaria barbara.* 8arbaraspecies include *Persea palustris, Asimina triloba,* and *Vaccinium fuscatum*. The herbaceous composition is similar to the *Nyssa biflora – Liquidambar styraciflua – Acer rubrum var. trilobum / Clethra alnifolia* Forest (CEGL004679), with *Woodwardia areolata* replacing *W. virginica* in this community.

VI. Coastal Plain lowland evergreen forests and shrublands

A. White cedar forests

1) *Chamaecyparis thyoides / Persea palustris / Lyonia lucida – Ilex coriacea* Forest (CEGL006146)

NVC Fit = Good Plots = 076-02-1032, 076-04-1025

This community is found on flat, permanently saturated peatlands of nonriverine bottomlands of the Atlantic Coastal Plain. The canopy is dominated by *Chamaecyparis thyoides,* with lesser amounts of *Nyssa biflora* and *Acer rubrum var. rubrum*. Subcanopy species include *Persea palustris, Magnolia virginiana var. virginiana* and *Ilex opaca var. opaca.* A moderately dense shrub stratum is composed of *Lyonia lucida, Ilex glabra,* and *Clethra alnifolia*. A sparse herbaceous stratum includes *Woodwardia virginica* and *Osmunda cinnamomea*.

B. Pondpine Forests and Woodlands

1) *Pinus serotina / Ilex glabra / Woodwardia virginica* Woodland (CEGL004652)

NVC Fit = Good Plots = 076-04-1024

The canopy of this community type is codominated by *Acer rubrum var. rubrum* and *Pinus serotina*. Shrub densities are high in this type and include *Persea palustris, Ilex coriacea, Ilex glabra, Lyonia lucida*, and *Clethra alnifolia*. Several species of *Vaccinium* are found on this plot, including *Vaccinium formosum, Vaccinium fuscatum,* and *Vaccinium palidum*. The herbaceous diversity of this community is low. Species present include *Rubus flagellaris* and *Woodwardia areolata*.

VII. Coastal Plain seepage slopes and streamhead wetlands

A. Streamhead Hardwood Swamps

1) *Nyssa biflora – Acer rubrum var. trilobum – Liriodendron tulipifera / Ilex coriacea – Lyonia lucida* Forest (CEGL004645)

NVC Fit = Medium Plots = 076-01-1027

This seepage community typically occurs on gentle sandhill slopes of the South Atlantic Coastal Plain. This plot is from Merchant's Millpond, Gates County, North Carolina, and well outside the predicted range of this community type. Canopy dominants in this community include *Acer rubrum var. trilobum, Nyssa biflora, Oxydendrum arboreum, and Pinus taeda*. The NVC recognizes *Liriodendron tulipifera* as a canopy dominant, but this species was not found in the canopy of this plot. The high density of *Eleocharis tortilis* in the herb layer of the plot further separates it from the NVC model. Subcanopy trees found in this plot include *Fagus grandifolia var. caroliniana, Magnolia virginiana var. virginiana, Ilex opaca var. opaca,* and *Liquidambar styraciflua.* The shrub stratum is moderately open (20%) and includes *Vaccinium fuscatum, Vaccinium formosum, Vaccinium palidum,* and *Gaylussacia frondosa.* Other herbs found in this plot include *Carex laxiflora, Carex striata var. brevis, Chasmanthium laxum, Triadenum walteri,* and *Rhynchospora gracilenta*. This plot also distinguishes itself from the NVC model by having an open shrub stratum and a more diverse herb component.

VIII. Freshwater tidal woodlands

A. Tidal Hardwood Swamps

1) *Nyssa biflora – (Nyssa aquatica, Taxodium distichum)* Tidal Forest (CEGL004484)

NVC Fit = Medium Plots = 076-04-1031

NVC recognizes the need for further examination of these broadly defined tidally flooded riverine swamps along the Outer Coastal Plain. In this example, the community is permanently flooded and is composed of *Nyssa biflora* and *Taxodium ascendens* in the canopy. Other minor canopy and subcanopy species include *Magnolia virginiana var. virginiana, Chamaecyparis thyoides*, *Liquidambar styraciflua*, and *Ilex opaca var. opaca*. Species diversity is high in this community type owing to the nutrient loads from tidal waters. Shrub species found on this community type include *Arundinaria tecta, Ilex glabra, Lyonia ligustrina, Lyonia lucida, Morella cerifera,* and *Persea palustris.* Ground species found on this community type include *Carex debilis, Carex lonchocarpa, Carex radiate, Mitchella repens, Saururus cernuus,* and *Woodwardia areolata*.

2) *Nyssa biflora – Nyssa aquatic – Taxodium distichum / Saururus cernuus* Forest (CEGL004696)

NVC Fit = Medium Plots = 076-03-1021

This tidal influenced swamp forest is dominated by species from both tidal and non-tidal cypress-gum swamps and NVC recognizes that perhaps these should be split from one another and merged with their corresponding components of the *Nyssa biflora – (Nyssa aquatica, Taxodium distichum)* Tidal Forest (CEGL004484). Canopy species diversity is relatively higher in this community type and includes *Quercus laurifolia, Nyssa biflora, Liquidambar styraciflua, Acer rubrum, Pinus taeda, Quercus pagoda,* and *Ulmus americana var. americana*. Shrub species found in this community include *Fraxinus caroliniana, Ilex glabra, Leucothoe axillaris, Morella caroliniensis, Vaccinium fuscatum,* and *Viburnum nudum*. A diversity of high climbing vines and ground species is characteristic of this community.

3) *Fraxinus (profunda, pennsylvanica) – (Nyssa biflora) / Polygonum arifolium* Woodland (CEGL006287)

NVC Fit = Medium Plots = 076-04-1030

This community is found along the upper reaches of tidal influenced rivers in the Chesapeake Bay drainage and has not been described in North Carolina. Like other tidal swamps of the study area, this community receives irregular flooding due to its distance from the shore and reliance on wind-driven tidal episodes. Dominant tree species in this plot include *Nyssa biflora* and *Fraxinus pennsylvanica*; other canopy and subcanopy trees include *Acer rubrum vars. rubrum and trilobum, Fraxinus caroliniana, Ilex opaca var. opaca, Magnolia virginiana var. virginiana, and Pinus serotina.* The diverse shrub stratum includes such species as *Alnus serrulata, Arundinaria tecta, Clethra alnifolia, Cornus foemina, Itea virginica, Lyonia ligustrina, Morella cerifera, Persea palustris, Rhododendron viscosum, Vaccinium sempervirens,* and *Viburnum dentatum var. dentatum.* Herbaceous species include *Apios americana, Carex crinita, Carex radiata, Cicuta maculata var. maculata, Galium obtusum var. obtusum, Ludwigia palustris, Osmunda regalis var. spectabilis, Persicaria arifolia, Polypodium virginianum, Triadenum virginicum, Viola primulifolia,* and *Woodwardia areolata*.

4) *Juniperus virginiana var. silicicola / Morella cerifera / Kosteletzkya virginica – Bacopa monnieri* Woodland (CEGL007166)

NVC Fit = Poor Plots = 076-04-1035

This community is found along oligohaline tidal creeks in the Atlantic Coastal Plain of North Carolina. A sparsely dense canopy is composed of *Juniperus virginiana var. silicicola, Persea palustris,* and *Nyssa biflora*. Shrub species found in this example include *Morella cerifera, Rosa palustris,* and *Vaccinium fuscatum*. The herb stratum is surprisingly dense and diverse, which differentiates this plot from the NVC general description of this community type. Specifically, a rich layer of *Triglochin striata* (cover class = 8) is located on this plot. Other species include *Sabatia dodecandra, Pluchea foetida var. foetida, Osmunda regalis var. spectabilis, Osmunda cinnamomea, Kosteletzkya virginica var. virginica*, *Cladium jamaicense,* and *Centella erecta.*

B. Tidal Cypress Swamps

1) *Taxodium distichum/ Typha angustifolia* Woodland (CEGL004231)

NVC Fit = Good Plots = 076-04-1034

This freshwater tidal woodland is influenced by irregular wind-driven tides in the Atlantic Coastal Plain of North Carolina. An open canopy of *Taxodium distichum* is diagnostic of this community type. Ground cover includes marsh species such as *Cladium jamaicense*, *Thelypteris palustris var. pubescens,* and *Sagittaria lancifolia var. media.*

C. Oligohaline Tidal Woodlands

1) *Pinus serotina / Morella cerifera / Osmunda regalis var. spectabilis* Woodland (CEGL003669)

NVC Fit = Medium - Good

Plots = 076-01-1022, 076-04-1020, 076-04-1028, 076-04-1037, 076-06-1024

This woodland community is characterized by occurring on large peat domes on tidal wetlands of riverine systems of North Carolina. These nutrient rich sites are heavily influenced by wind-driven, seasonal tide episodes throughout the sample region of this study. *Pinus serotina* and *Acer rubrum vars. rubrum* and *trilobum* occur as constant canopy species in this community, with heights ranging from 10 to 20 meters. Shrubs that are often found in this community include *Morella cerifera*, *Ilex glabra*, and *Persea palustris*. Diagnostic herbs include *Osmunda regalis var. spectabilis, Woodwardia virginica,* and *Cladium jamaicense*. Some of these plots may intergrade with other tidal communities based on the degree of influence of wind versus lunar tides and the corresponding proportion of salinity in the water table. Herbaceous species found in gradients of higher salinity include *Hibiscus moscheutos ssp. moscheutos*, *Eleocharis fallax*, and *Panicum virgatum var. virgatum*. These woodlands also can intergrade with **Oligohaline Tidal Marshes** where the water table is higher. These tonal communities are characterized by the dense occurrence of *Typha angustifolia* growing with diagnostic woodland species.

IX. Shrubby tidal vegetation

A. Brackish Tidal Shrub Flats

1) *Morella cerifera – Rosa palustris / Thelypteris palustris var. pubescens* Shrubland (CEGL004656)

NVC Fit = Medium to Good

Plots = 076-02-1024, 076-04-1021, 076-04-1023, 076-06-1022, 076-06-1023, 076-06-1026

This community represents an ecotone between oligohaline tidal marshes and swamps, and is maintained by a combination of hydrologic and fire disturbances. Because of the complexity of disturbance history within this community, there are varying degrees of species composition and structure among plots. *Morella cerifera* and *Rosa palustris* are constant species found within this community type. Other species with high constancy include *Osmunda regalis var. spectabilis, Toxicodendron radicans, Thelypteris palustris var. pubescens, Hydrocotyle umbellata, Triadenum walteri, Typha domingensis,* and *Mikania scandens*.

2) *Iva frutescens / Spartina cynosuroides* Tidal Shrubland (CEGL006847)

NVC Fit = Medium Plots = 076-03-1022

This community represents another ecotone between tidal marshes and hardwood forests along tidal rivers in the Chesapeake Drainage. The NVC does not currently recognize this community occurring in North Carolina, although this plot occurs within Currituck Sound in the far northeastern corner of the state. The plot is dominated by a dense herbaceous layer of *Spartina cynosuroides* and a moderately open shrub component of *Morella cerifera* and *Iva frutescens*. The NVC describes this community type as being codominated by both *Spartina cynosuroides* and *Iva frutescens*. In this example, the cordgrass is clearly the dominant. Other species that were found in this community include *Baccharis halimifolia, Eleocharis obtuse, Hibiscus moscheutos ssp. moscheutos, Ludwigia alata, Sagittaria lancifolia var. media, Thelypteris palustris var. pubescens, Typha angustifolia,* and *Typha domingensis*.

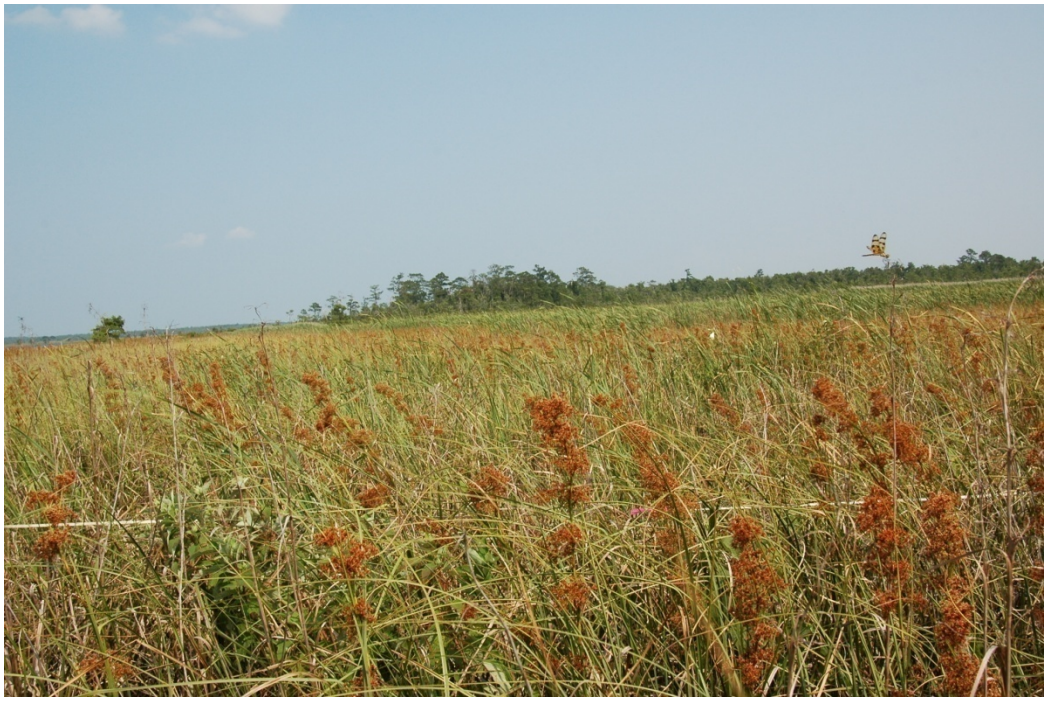
X. Open salt and brackish tidal vegetation

A. Brackish Marshes

1) *Cladium mariscus ssp. jamaicense* Tidal Herbaceous Vegetation (CEGL004178)

NVC Fit = Excellent Plots = 076-04-1033, 076-04-1036

This is a typical brackish marsh community found along the Atlantic Coast. It is dominated by a dense coverage of *Cladium jamaicense*. Other species include *Baccharis halimifolia, Hibiscus moscheutos ssp. moscheutos, Juncus roemerianus, Osmunda regalis var. spectabilis, Sagittaria lancifolia var. media,* and *Typha domingensis*.



2) *Juncus roemerianus* Herbaceous Vegetation (CEGL004186)

NVC Fit = Medium Plots = 076-03-1023

This is widely distributed salt marsh community throughout the Coastal Fringe area of the southeastern US. The NVC concludes that this type is typically found above the average high tide zone and thus experiences only irregular tidal floods. Although vegetatively similar to the community, this plot was found in an oligohaline tidal marsh. This plot represents a middle gradient between a low salinity *Juncus roemerianus – Pontedaria cordata* Herbaceous Vegetation (CEGL004660) community and a high salinity *Juncus roemerianus* Herbaceous Vegetation (CEGL004186) communily. This plot is characterized by a dense cover of *Juncus roemerianus* occurring with *Hibiscus moscheutos ssp. palustris, Kosteletzkya virginica var. virginica, Mikania scandens,* and *Thelypteris palustris var. pubescens.*

XI. Open fresh and oligohaline vegetation

A. Oligohaline Tidal Marshes

1) *Eleocharis fallax – Eleocharis rostellata – Schoenoplectus americanus – Sagittaria lancifolia* Herbaceous Vegetation (CEGL004628)

NVC Fit = Good

Plots = 076-01-1021, 076-01-1024, 076-04-1026, 076-06-1021

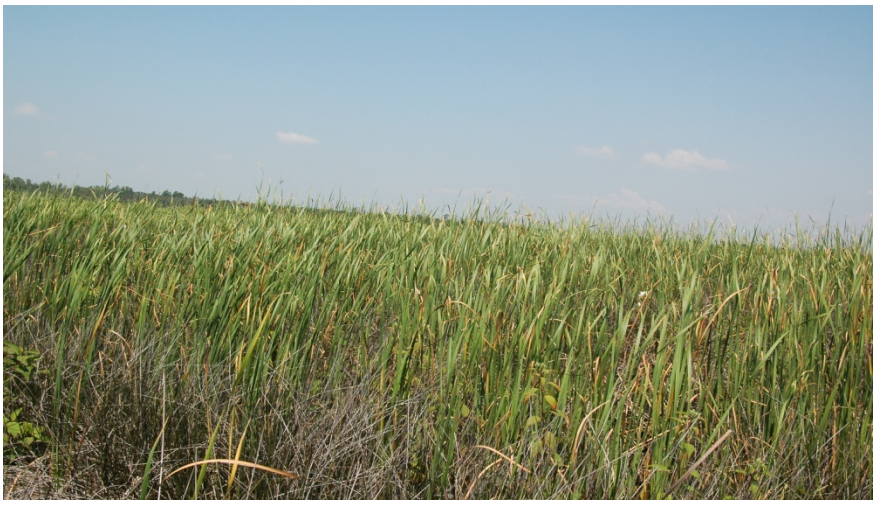
Also known as "spikerush lawns", these communities occur on peat formations of oligohaline tidal marshes. However, *Eleocharis* is not a constant species in these plots. Instead, species with high constancy include *Typha domingensis, Sagittaria lancifolia var. media, Juncus roemerianus,* and *Scheonoplectus americanus*.

2) *Juncus roemerianus – Pontedaria cordata* Herbaceous Vegetation (CEGL004660)

NVC Fit = Good to Excellent

Plots = 076-01-1025, 076-02-1026, 076-02-1027, 076-04-1027, 076-06-1020

This is a wind-tide, freshwater community known from Currituck Sound, North Carolina. The dominant species in these marshes is *Juncus roemerianus*. Other species that occur include *Sagittaria lancifolia var. media, Typha angustifolia,* and *Lythrum lineare*.



3) *Spartina cynosuroides – Panicum virgatum – Phyla lanceolata* Herbaceous Vegetation (CEGL007741)

NVC Fit = Good Plots = 076-04-1029, 076-06-1025

The characteristic species in this wind-tide, oligohaline marsh is *Spartina cynosuroides*. Other species with relatively high cover values include *Amorpha fruticosa, Cladium jamaicense, Kosteletzkya virginica, Mikania scandens, Persicaria sagittata,* and *Sagittaria lancifolia var. media.*

4) *Spartina cynosuroides* Herbaceous Vegetation (CEGL004195)

NVC Fit = Medium Plots = 076-02-1022

Both this community and *Spartina cynosuroides – Panicum virgatum – Phyla lanceolata* Herbaceous Vegetation (CEGL007741) are dominated by nearly monotypic sub-shrub strata of *Spartina*

cynosuroides. According to the NVC, the difference between the communities is in the composition of associated species and the occurrence of CEGL007741 in wind-tidal zones of North Carolina and Virginia. However, this plot was located on a wind-tidal area of the Northwest River in Currituck County, North Carolina. This plot was dominated by both *Typha domingensis* and *Spartina cynosuroides*, with lesser amounts of *Cladium jamaicense, Hibiscus moscheutos ssp. moscheutos,* and *Pontederia cordata var. cordata.*

5) *Typha angustifolia – Hibiscus moscheutos* Herbaceous Vegetation (CEGL004201)

NVC Fit = Poor to Medium Plots = 076-01-1020, 076-02-1021, 076-02-1023, 076-02-1031

The NVC recognizes this community type as occurring in the northern to central Atlantic Coastal Plain and potentially occurring as far south as North and South Carolina. It occurs on brackish tidewater rivers and has a floristic composition of both freshwater and saltwater species. The plots sampled here bare little resemblance to the described community type and should be further examined. Dominant species in the plot include *Typha domingensis, Osmunda regalis var. spectabilis,* and *Scheonoplectus americanus*. There is an open shrub stratum within this plot composed of *Acer rubrum var. rubrum* and *Morella cerifera*, suggesting that this plot may represent a slight tonal variant from freshwater marsh to shrubland.

6) *Schoenoplectus pungens* - (*Osmunda regalis var. spectabilis*) Herbaceous Vegetation (CEGL004189)

NVC Fit = Medium Plots = 076-01-1029

Similar to *Eleocharis fallax – Eleocharis rostellata – Schoenoplectus americanus – Sagittaria lancifolia* Herbaceous Vegetation (CEGL004628), this community occurs on peaty, oligohaline tidal marshes along the Outer Coastal Plain of North Carolina. This plot represents a split from these two communities, and more data should be gathered to confirm its classification placement. The plot is dominated by a dense sub-shrub canopy of *Schoenoplectus americanus* growing above a lower stratum of *Sagittaria lancifolia var. media.* There is also a significant portion of *Eleocharis obtusa* and *Persicaria punctata* found on this plot.

CONCLUSIONS AND FUTURE DIRECTIONS

Collected plots were assigned to 28 vegetation types. In some cases the plots site well into established types, but or the most part our plots deviate from the previous descriptions suggesting a need for

substantial refinement of the NVC. In particular, 17 plots only marginally fit within the classification, and 4 seemed to fit not at all. Appendix 2 provides a summary table for identified groups that do not fit well into the current NVC schema. As illustrated in the above descriptions, much work is needed to refine Coastal Fringe hydric to mesic vegetation communities within North Carolina. Particularly of interest is the refinement of classification among vegetation types that exist along a salinity gradient within wind-tide driven marshes. ~~Additional plots~~Additional plots established in the Coastal Fringe of North Carolina will be needed to increase our understanding of these undersampled communities. For now, however, these current plots will provide a framework for future classification projects undertaken in the study area.

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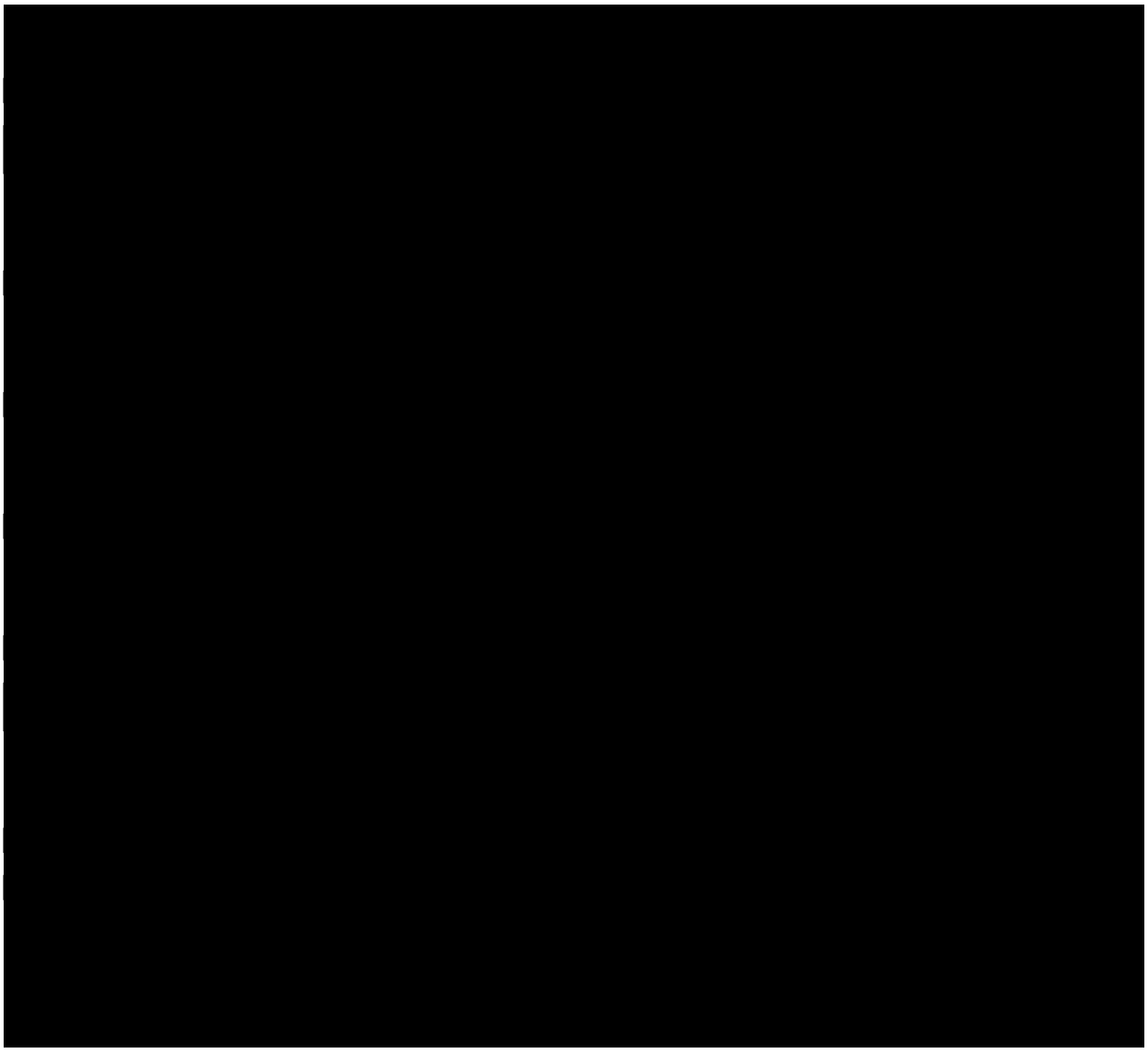
Appendix 1: Soil Nutrient and Texture Values Summarized by Association. Specific soil variables include pH, Organic Matter (%), exchangeable cations (Ca, Mg, K, Na, Mn; ppm), texture class (clay, silt, sand; %).



Appendix 2: Association Groups with Poor or Medium Fit

CEGL	# of Plots	NVC FIT	Reason
Fagus grandifolia - Quercus alba - (*Acer barbatum*) / Mixed Herbs Forest (CEGL007206)	1	Medium	Poor understanding of relationship with other eutrophic forests of the Atlantic Coastal Plain
Fagus grandifolia - Quercus nigra Forest (CEGL007211)	1	Medium	Low density of *Quercus nigra* on the plot
Taxodium distichum – Nyssa biflora / Fraxinus caroliniana / Lyonia lucida Forest (CEGL004733)	1	Medium	Plot more representative of an ecotone between tidal flood swamps and inland blackwater forests
Nyssa biflora – Acer rubrum var. trilobum – Liriodendron tulipifera / Ilex coriacea – Lyonia lucida Forest *(CEGL004645)*	1	Medium	Lack of *Liriodendron tulipifera* as a canopy dominant; high density of *Eleocharis tortilis;* plot falls outside the predicted range of the community type
Nyssa biflora – (Nyssa aquatica, Taxodium distichum) Tidal Forest (CEGL004484)	1	Medium	Poor understanding of broadly defined Tidal Hardwood Swamps
Nyssa biflora – Nyssa aquatic – Taxodium distichum / Saururus cernuus Forest (CEGL004696)	1	Medium	Poor understanding of broadly defined Tidal Hardwood Swamps
Fraxinus (profunda, pennsylvanica) – (Nyssa biflora) / Polygonum arifolium Woodland (CEGL006287)	1	Medium	Poor understanding of broadly defined Tidal Hardwood Swamps; plot falls outside the predicted range of the community type
Juniperus virginiana var. silicicola / Morella cerifera / Kosteletzkya virginica – Bacopa monnieri Woodland (CEGL007166)	1	Poor	Poor understanding of broadly defined Tidal Hardwood Swamps; herb stratum is more diverse than the original community description
Pinus serotina / Morella cerifera / Osmunda regalis var. spectabilis Woodland (CEGL003669)	3	Medium	Plots may intergrade with other oligohaline tidal communities
Morella cerifera – Rosa palustris / Thelypteris palustris var. pubescens Shrubland (CEGL004656)	3	Medium	Plots may intergrade with other oligohaline tidal communities
Iva frutescens / Spartina cynosuroides Tidal Shrubland (CEGL006847)	1	Medium	Plot falls outside the predicted range of the community type; low density of *Iva frutescens*
Juncus roemerianus Herbaceous Vegetation (CEGL004186)	1	Medium	Plot was found in an oligohaline tide zone
Typha angustifolia – Hibiscus moscheutos Herbaceous Vegetation (CEGL004201)	4	Poor to Medium	Plots' floristic composition bare little resemblance to described community
Schoenoplectus pungens - (*Osmunda regalis var. spectabilis*) Herbaceous Vegetation (CEGL004189)	1	Medium	Poor understanding of this community type, particularly with relation to *Eleocharis fallax – Eleocharis rostellata – Schoenoplectus americanus – Sagittaria lancifolia* Herbaceous Vegetation (CEGL004628)

Appendix 3: Floristic tables for Association Groups

Floristic table for Group I.A.1: *Fagus grandifolia* - *Quercus alba* - (*Acer barbatum*) / Mixed Herbs Forest (CEGL007206)

NUMBER of PLOTS	1
AVERAGE RICHNESS	42
SPECIES	**COVER CLASS**
Fagus grandifolia var. caroliniana	8
Quercus alba	7
Oxydendrum arboreum	6
Ilex opaca var. opaca	5
Liquidambar styraciflua	5
Quercus falcata	5
Pinus taeda	3
Quercus michauxii	3
Symplocos tinctoria	3
Acer rubrum	2
Andropogon glomeratus	2
Aralia spinosa	2
Bryophyte sp.	2
Chasmanthium laxum	2
Diospyros virginiana	2
Hexastylis arifolia var. arifolia	2
Liriodendron tulipifera var. tulipifera	2
Mitchella repens	2
Prunus serotina var. serotina	2
Quercus nigra	2
Sassafras albidum	2
Smilax glauca	2
Styrax grandifolius	2
Tillandsia usneoides	2
Toxicodendron radicans var. radicans	2
Vaccinium corymbosum	2
Vaccinium pallidum	2
Vitis rotundifolia var. rotundifolia	2

Floristic table for Group I.B.1: *Fagus grandifolia - Liriodendron tulipifera / Euonymus americana / Athyrium filix-femina* ssp. *asplenioides* Forest (CEGL007201)

NUMBER of PLOTS	1
AVERAGE RICHNESS	36
SPECIES	**COVER CLASS**
Fagus grandifolia var. caroliniana	8
Carya alba	6
Acer rubrum	4
Ilex opaca var. opaca	3
Thelypteris noveboracensis	3
Vitis rotundifolia var. rotundifolia	3
Aralia spinosa	2
Bryophyte sp.	2
Cornus florida	2
Euonymus americanus	2
Lichen sp.	2
Liquidambar styraciflua	2
Liriodendron tulipifera var. tulipifera	2
Mitchella repens	2
Oxydendrum arboreum	2
Quercus nigra	2
Smilax rotundifolia	2

Floristic table for Group I.B.2: *Fagus grandifolia* - *Quercus nigra* Forest (CEGL007211)

NUMBER of PLOTS	1
AVERAGE RICHNESS	46
SPECIES	**COVER CLASS**
Acer rubrum	7
Fagus grandifolia var. caroliniana	7
Quercus alba	7
Oxydendrum arboreum	6
Ilex opaca var. opaca	4
Quercus michauxii	4
Liriodendron tulipifera var. tulipifera	3
Andropogon virginicus	2
Aralia spinosa	2
Baccharis halimifolia	2
Carex laxiculmis var. copulata	2
Carpinus caroliniana var. caroliniana	2
Carya glabra	2
Chasmanthium laxum	2
Dichanthelium commutatum var. commutatum	2
Dichanthelium dichotomum var. roanokense	2
Epifagus virginiana	2
Euonymus americanus	2
Gelsemium sempervirens	2
Hypericum hypericoides	2
Liquidambar styraciflua	2
Magnolia virginiana var. virginiana	2
Mitchella repens	2
Parthenocissus quinquefolia	2
Pinus taeda	2
Pyrola americana	2
Quercus nigra	2
Smilax rotundifolia	2
Vaccinium pallidum	2
Vitis rotundifolia var. rotundifolia	2
Woodwardia areolata	2

Floristic table for Group II.A.1: *Pinus taeda - Liquidambar styraciflua* Semi-natural Forest (CEGL008462)

NUMBER of PLOTS	1		
AVERAGE RICHNESS	58		
SPECIES	**COVER CLASS**	**SPECIES**	**COVER CLASS**
Liquidambar styraciflua	8	Dichanthelium laxiflorum	2
Carpinus caroliniana var. caroliniana	6	Diospyros virginiana	2
Pinus taeda	6	Elephantopus nudatus	2
Quercus michauxii	6	Euonymus americanus	2
Acer rubrum	5	Gaylussacia frondosa	2
Arundinaria tecta	5	Gelsemium sempervirens	2
Persea palustris	5	Hieracium gronovii	2
Quercus hemisphaerica	5	Ilex opaca var. opaca	2
Quercus laurifolia	5	Lonicera sempervirens var. sempervirens	2
Toxicodendron radicans var. radicans	5	Magnolia virginiana var. virginiana	2
Vitis rotundifolia var. rotundifolia	5	Osmunda cinnamomea var. cinnamomea	2
Mitchella repens	4	Parthenocissus quinquefolia	2
Morus rubra	4	Prenanthes trifoliolata	2
Nyssa sylvatica	4	Quercus pagoda	2
Prunus serotina var. serotina	4	Quercus velutina	2
Quercus nigra	4	Rubus argutus/flagellaris	2
Carex floridana	3	Scleria sp.	2
Morella cerifera	3	Smilax bona-nox	2
Amelanchier canadensis	2	Smilax glauca	2
Aralia spinosa	2	Smilax rotundifolia	2
Arisaema triphyllum	2	Solidago rugosa	2
Bartonia virginica	2	Vaccinium formosum	2
Callicarpa americana	2	Vaccinium fuscatum	2
Chasmanthium laxum	2	Vaccinium pallidum	2
Decumaria barbara	2	Vitis vulpina	2
Desmodium paniculatum var. paniculatum	2	Woodwardia areolata	2
Desmodium sp.	2		

Floristic table for Group III.A.1: *Nyssa aquatic* Forest (CEGL002419)

NUMBER of PLOTS 2 AVERAGE RICHNESS 25		
SPECIES	CONSTANCY	AVERAGE COVER CLASS
Nyssa aquatica	100	8
Acer rubrum	100	7
Liquidambar styraciflua	100	5
Nyssa biflora	100	5
Toxicodendron radicans var. radicans	100	4
Saururus cernuus	100	3
Taxodium distichum	100	3
Decumaria barbara	100	2
Landoltia punctata	50	6
Lemna minor	50	6
Persicaria maculosa	50	4
Sparganium americanum	50	4
Bryophyte sp.	50	3
Limnobium spongia	50	3
Potamogeton pulcher	50	3
Spirodela polyrrhiza	50	3

Floristic table for Group IV.A.1: *Taxodium distichum – Nyssa biflora / Fraxinus caroliniana / Lyonia lucida* Forest (CEGL004733)

NUMBER of PLOTS 1 AVERAGE RICHNESS 50			
SPECIES	**COVER CLASS**	**SPECIES**	**COVER CLASS**
Morella cerifera	7	Apios americana	2
Taxodium distichum	7	Cicuta maculata var. maculata	2
Toxicodendron radicans var. radicans	7	Clematis crispa	2
Acer rubrum	6	Decodon verticillatus	2
Osmunda regalis var. spectabilis	6	Gelsemium sempervirens	2
Peltandra virginica	6	Hydrocotyle umbellata/verticillata	2
Fraxinus caroliniana	5	Ilex glabra	2
Liquidambar styraciflua	5	Itea virginica	2
Nyssa biflora	5	Lobelia cardinalis	2
Rosa palustris	5	Ludwigia Ludwigia alata/decurrens/glandulosa/palustris	2
Fraxinus pennsylvanica	4	Mitchella repens	2
Iris virginica var. virginica	4	Parthenocissus quinquefolia	2
Rhododendron atlanticum	4	Persea palustris	2
Rhododendron viscosum	4	Persicaria arifolia	2
Amelanchier obovalis	3	Persicaria punctata	2
Clethra alnifolia	3	Pontederia cordata var. cordata	2
Eubotrys racemosa	3	Smilax walteri	2
Lemna minor	3	Triadenum virginicum	2
Mikania scandens	3	Vaccinium fuscatum	2

Floristic table for Group V.A.1: *Quercus michauxii – Quercus pagoda / Clethra alnifolia – Leucothoe axillaris* Forest (CEGL007449)

NUMBER of PLOTS AVERAGE RICHNESS	2 65	
SPECIES	CONSTANCY	AVERAGE COVER CLASS
Arundinaria tecta	100	7
Quercus michauxii	100	7
Acer rubrum	100	7
Liquidambar styraciflua	100	6
Liriodendron tulipifera var. tulipifera	100	6
Quercus laurifolia	100	6
Ilex opaca var. opaca	100	5
Quercus alba	100	5
Fraxinus pennsylvanica	100	4
Dichanthelium dichotomum var. ramulosum	100	4
Vaccinium fuscatum	100	4
Carpinus caroliniana var. caroliniana	100	3
Sphagnum sp.	100	3
Vitis rotundifolia var. rotundifolia	100	3
Arisaema triphyllum	100	2
Diospyros virginiana	100	2
Rubus argutus/flagellaris	100	2
Carex laxiflora	100	2
Mitchella repens	100	2
Parthenocissus quinquefolia	100	2
Smilax glauca	100	2
Osmunda regalis var. spectabilis	100	2
Fagus grandifolia var. caroliniana	100	2
Smilax walteri	100	2
Thelypteris noveboracensis	100	2
Toxicodendron radicans var. radicans	100	2
Carya ovata	50	5
Persea palustris	50	5
Quercus pagoda	50	5
Gaylussacia frondosa	50	4
Magnolia virginiana var. virginiana	50	4
Nyssa biflora	50	4
Oxydendrum arboreum	50	4
Smilax rotundifolia	50	4

Floristic table for Group V.B.1: *Nyssa biflora – Liquidambar styraciflua – Acer rubrum var. trilobum / Clethra alnifolia* Forest (CEGL004679)

NUMBER of PLOTS	1
AVERAGE RICHNESS	28
SPECIES	COVER CLASS
Clethra alnifolia	8
Nyssa biflora	8
Acer rubrum var. trilobum	7
Pinus taeda	6
Asimina triloba	5
Persea palustris	5
Ilex opaca var. opaca	4
Magnolia virginiana var. virginiana	4
Vaccinium fuscatum	4
Liquidambar styraciflua	3
Berchemia scandens	2
Bryophyte sp.	2
Decumaria barbara	2
Eubotrys racemosa	2
Ilex glabra	2
Lyonia lucida	2
Osmunda cinnamomea var. cinnamomea	2
Osmunda regalis var. spectabilis	2
Parthenocissus quinquefolia	2
Quercus nigra	2
Smilax glauca	2
Smilax laurifolia	2
Toxicodendron radicans var. radicans	2
Vitis rotundifolia var. rotundifolia	2
Woodwardia virginica	2

Floristic table for Group V.B.2: *Taxodium distichum – Nyssa biflora / Berchemia scandens – Toxicodendron radicans / Woodwardia areolata* Forest (CEGL004429)

NUMBER of PLOTS	1
AVERAGE RICHNESS	37
SPECIES	COVER CLASS
Acer rubrum var. triolobum	8
Nyssa biflora	8
Persea palustris	7
Taxodium distichum	7
Ilex opaca var. opaca	6
Toxicodendron radicans var. radicans	6
Vitis rotundifolia var. rotundifolia	5
Asimina triloba	4
Smilax rotundifolia	4
Decumaria barbara	3
Vaccinium fuscatum	3
Arundinaria tecta	2
Bignonia capreolata	2
Clethra alnifolia	2
Eubotrys racemosa	2
Euonymus americanus	2
Gelsemium sempervirens	2
Liquidambar styraciflua	2
Lonicera japonica	2
Magnolia virginiana var. virginiana	2
Osmunda cinnamomea var. cinnamomea	2
Osmunda regalis var. spectabilis	2
Parthenocissus quinquefolia	2
Quercus laurifolia	2
Rubus argutus/flagellaris	2
Smilax laurifolia	2
Smilax walteri	2
Woodwardia areolata	2

Floristic table for Group VI.A.1: *Chamaecyparis thyoides / Persea palustris / Lyonia lucida – Ilex coriacea* Forest (CEGL006146)

NUMBER of PLOTS 2 AVERAGE RICHNESS 18		
SPECIES	CONSTANCY	AVERAGE COVER CLASS
Chamaecyparis thyoides	100	7
Ilex glabra	100	6
Lyonia lucida	100	6
Persea palustris	100	5
Clethra alnifolia	100	5
Smilax laurifolia	100	4
Acer rubrum	100	4
Ilex opaca var. opaca	100	4
Magnolia virginiana var. virginiana	100	3
Parthenocissus quinquefolia	100	2
Gelsemium sempervirens	100	2
Toxicodendron radicans var. radicans	100	1
Nyssa biflora	50	5
Lyonia ligustrina	50	4
Itea virginica	50	3
Vaccinium formosum	50	3

Floristic table for Group VI.B.1: *Pinus serotina / Ilex glabra / Woodwardia virginica* Woodland (CEGL004652)

NUMBER of PLOTS	1
AVERAGE RICHNESS	26
SPECIES	COVER CLASS
Acer rubrum	8
Ilex coriacea	7
Persea palustris	7
Pinus serotina	7
Clethra alnifolia	6
Ilex glabra	6
Lyonia lucida	6
Nyssa biflora	6
Vitis rotundifolia var. rotundifolia	6
Parthenocissus quinquefolia	5
Smilax laurifolia	5
Ilex opaca var. opaca	4
Vaccinium formosum	4
Vaccinium fuscatum	4
Magnolia virginiana var. virginiana	3
Smilax rotundifolia	3
Eubotrys racemosa	2
Gelsemium sempervirens	2
Lyonia ligustrina	2
Rubus argutus/flagellaris	2
Smilax glauca	2
Toxicodendron radicans var. radicans	2
Vaccinium pallidum	2
Woodwardia areolata	2

Floristic table for Group VII.A.1: *Nyssa biflora – Acer rubrum var. trilobum – Liriodendron tulipifera / Ilex coriacea – Lyonia lucida* Forest (CEGL004645)

NUMBER of PLOTS 1 AVERAGE RICHNESS 47			
SPECIES	COVER CLASS	SPECIES	COVER CLASS
Acer rubrum	9	Andropogon virginicus	2
Arundinaria tecta	7	Bartonia virginica	2
Eleocharis tortilis	7	Carex laxiflora	2
Nyssa biflora	6	Carex striata var. brevis	2
Oxydendrum arboreum	6	Juncus coriaceus	2
Chasmanthium laxum	5	Liriodendron tulipifera var. tulipifera	2
Liquidambar styraciflua	5	Lycopus virginicus	2
Magnolia virginiana var. virginiana	5	Mitchella repens	2
Pinus taeda	5	Osmunda regalis var. spectabilis	2
Sphagnum sp.	5	Quercus laurifolia	2
Dichanthelium lucidum	4	Rhexia virginica	2
Ilex opaca var. opaca	4	Rhododendron viscosum	2
Quercus alba	4	Rhynchospora gracilenta	2
Fagus grandifolia var. caroliniana	3	Smilax laurifolia	2
Gaylussacia frondosa	3	Smilax rotundifolia	2
Osmunda cinnamomea var. cinnamomea	3	Symplocos tinctoria	2
Quercus nigra	3	Toxicodendron radicans var. radicans	2
Vaccinium formosum	3	Triadenum walteri	2
Vaccinium fuscatum	3	Vaccinium pallidum	2
Aegilops triuncialis	2	Woodwardia areolata	2

Floristic table for Group VIII.A.1: *Nyssa biflora – (Nyssa aquatica, Taxodium distichum)* Tidal Forest (CEGL004484)

NUMBER of PLOTS 1 AVERAGE RICHNESS 44			
SPECIES	COVER CLASS	SPECIES	COVER CLASS
Nyssa biflora	8	Amelanchier canadensis	2
Acer rubrum	6	Berchemia scandens	2
Arundinaria tecta	6	Carex debilis	2
Lyonia lucida	6	Carex lonchocarpa	2
Magnolia virginiana var. virginiana	6	Carex radiata	2
Saururus cernuus	6	Cephalanthus occidentalis	2
Taxodium ascendens	6	Clethra alnifolia	2
Chamaecyparis thyoides	5	Decumaria barbara	2
Eubotrys racemosa	5	Dulichium arundinaceum var. arundinaceum	2
Lyonia ligustrina	5	Gaylussacia frondosa	2
Morella cerifera	5	Itea virginica	2
Ilex glabra	4	Lemna minor	2
Ilex opaca var. opaca	4	Limnobium spongia	2
Liquidambar styraciflua	4	Mitchella repens	2
Persea palustris	4	Osmunda cinnamomea var. cinnamomea	2
Rhododendron atlanticum	4	Osmunda regalis var. spectabilis	2
Rhododendron viscosum	4	Pinus serotina	2
Smilax walteri	4	Rosa palustris	2
Alnus serrulata	3	Toxicodendron radicans var. radicans	2
Smilax laurifolia	3	Vitis rotundifolia var. rotundifolia	2
Vaccinium formosum	3	Wolffia sp.	2
Viburnum nudum	3	Woodwardia areolata	2

Floristic table for Group VIII.A.2: *Nyssa biflora – Nyssa aquatic – Taxodium distichum / Saururus cernuus* Forest (CEGL004696)

NUMBER of PLOTS	1		
AVERAGE RICHNESS	74		
SPECIES	COVER CLASS	SPECIES	COVER CLASS
Limnobium spongia	7	Eubotrys racemosa	2
Quercus laurifolia	7	Eupatorium capillifolium	2
Liquidambar styraciflua	6	Gaylussacia frondosa	2
Nyssa biflora	6	Hypericum hypericoides	2
Saururus cernuus	6	Ilex glabra	2
Bidens frondosa	5	Leucothoe axillaris	2
Carex rosea	5	Ludwigia Ludwigia alata/decurrens/glandulosa/palustris	2
Ilex opaca var. opaca	5	Ludwigia Ludwigia alata/decurrens/glandulosa/palustris	2
Quercus michauxii	5	Lycopus virginicus	2
Woodwardia areolata	5	Lyonia lucida	2
Acer rubrum	4	Mitchella repens	2
Hexastylis arifolia var. arifolia	4	Morella caroliniensis	2
Magnolia virginiana var. virginiana	4	Osmunda cinnamomea var. cinnamomea	2
Osmunda regalis var. spectabilis	4	Oxydendrum arboreum	2
Persea palustris	4	Parthenocissus quinquefolia	2
Vaccinium fuscatum	4	Persicaria hydropiperoides	2
Carpinus caroliniana var. caroliniana	3	Photinia villosa	2
Fagus grandifolia var. caroliniana	3	Pinus taeda	2
Fraxinus caroliniana	3	Populus heterophylla	2
Juncus effusus ssp. solutus	3	Quercus phellos	2
Lemna minor	3	Rhynchospora chalarocephala	2
Liverwort sp.	3	Rubus argutus/flagellaris	2
Quercus nigra	3	Scirpus cyperinus	2
Quercus pagoda	3	Smilax glauca	2
Saccharum giganteum	3	Smilax laurifolia	2
Smilax rotundifolia	3	Smilax walteri	2
Viburnum nudum	3	Sphagnum sp.	2

Floristic table for Group VIII.A.3: *Fraxinus (profunda, pennsylvanica) – (Nyssa biflora) / Polygonum arifolium* Woodland (CEGL006287)

NUMBER of PLOTS	1		
AVERAGE RICHNESS	69		
SPECIES	COVER CLASS	SPECIES	COVER CLASS
Nyssa biflora	8	Circaea canadensis ssp. canadensis	2
Murdannia keisak	7	Clematis crispa	2
Carex radiata	6	Echinodorus cordifolius ssp. cordifolius	2
Fraxinus pennsylvanica	6	Eutrochium dubium	2
Lyonia ligustrina	6	Fraxinus caroliniana	2
Osmunda regalis var. spectabilis	6	Galium obtusum var. obtusum	2
Acer rubrum	5	Galium tinctorium var. floridanum	2
Arundinaria tecta	5	Hydrocotyle umbellata/verticillata	2
Clethra alnifolia	4	Ilex verticillata	2
Ilex opaca var. opaca	4	Leucothoe axillaris	2
Persea palustris	4	Limnobium spongia	2
Pinus serotina	4	Liverwort sp.	2
Rhododendron viscosum	4	Lobelia elongata/glandulosa	2
Toxicodendron radicans var. radicans	4	Ludwigia Ludwigia alata/decurrens/glandulosa/palustris	2
Woodwardia areolata	4	Magnolia virginiana var. virginiana	2
Acer rubrum	3	Mitchella repens	2
Cornus foemina	3	Parthenocissus quinquefolia	2
Decumaria barbara	3	Persicaria arifolia	2
Eubotrys racemosa	3	Persicaria hydropiperoides	2
Itea virginica	3	Phoradendron serotinum ssp. serotinum	2
Morella cerifera	3	Rosa palustris	2
Pleopeltis polypodioides ssp. michauxiana	3	Rubus argutus/flagellaris	2
Tillandsia usneoides	3	Smilax rotundifolia	2
Triadenum virginicum	3	Taxodium distichum	2
Alnus serrulata	2	Vaccinium sempervirens	2
Apios americana	2	Viburnum dentatum var. dentatum	2
Bidens frondosa	2	Viburnum nudum	2
Boehmeria cylindrica	2	Viola primulifolia	2
Carex crinita	2	Wolffiella gladiata	2
Cicuta maculata var. maculata	2		

Floristic table for Group VIII.A.4: *Juniperus virginiana var. silicicola / Morella cerifera / Kosteletzkya virginica – Bacopa monnieri* Woodland (CEGL007166)

NUMBER of PLOTS	1		
AVERAGE RICHNESS	45		
SPECIES	COVER CLASS	SPECIES	COVER CLASS
Triglochin striata	8	Bidens sp.	2
Morella cerifera	7	Dichanthelium dichotomum var. roanokense	2
Cladium jamaicense	6	Dichanthelium ensifolium	2
Hydrocotyle umbellata/verticillata	6	Erigeron vernus	2
Persea palustris	6	Eryngium aquaticum var. aquaticum	2
Centella erecta	5	Gelsemium sempervirens	2
Juniperus virginiana var. silicicola	5	Hibiscus moscheutos ssp. moscheutos	2
Osmunda regalis var. spectabilis	5	Iris virginica var. virginica	2
Rosa palustris	5	Kosteletzkya virginica var. virginica	2
Acer drummondii	4	Mikania scandens	2
Smilax laurifolia	4	Nyssa biflora	2
Thelypteris palustris var. pubescens	4	Oenothera fruticosa var. fruticosa	2
Toxicodendron radicans var. radicans	4	Osmunda cinnamomea var. cinnamomea	2
Vaccinium fuscatum	4	Peltandra virginica	2
Ilex glabra	3	Persicaria hydropiperoides	2
Sabatia dodecandra	3	Pluchea foetida var. foetida	2
Acer rubrum	2	Rubus argutus/flagellaris	2
Amaranthus cannabinus	2	Sagittaria lancifolia var. media	2
Amelanchier canadensis	2	Solidago sempervirens var. mexicana	2
Aronia arbutifolia	2	Woodwardia virginica	2
Baccharis halimifolia	2		

Floristic table for Group VIII.B.1: *Taxodium distichum/ Typha angustifolia* Woodland (CEGL004231)

NUMBER of PLOTS	1
AVERAGE RICHNESS	23
SPECIES	COVER CLASS
Cladium jamaicense	8
Baccharis halimifolia	6
Taxodium distichum	6
Thelypteris palustris var. pubescens	6
Morella cerifera	5
Sagittaria lancifolia var. media	5
Galium obtusum	4
Hibiscus moscheutos ssp. moscheutos	4
Osmunda regalis var. spectabilis	4
Mikania scandens	3
Toxicodendron radicans var. radicans	3
Triadenum virginicum	3
Amaranthus cannabinus	2
Asclepias incarnata var. pulchra	2
Boehmeria cylindrica	2
Juncus roemerianus	2
Kosteletzkya virginica var. virginica	2
Peltandra virginica	2
Rosa palustris	2
Teucrium canadense	2

Floristic table for Group IX.A.1: *Morella cerifera – Rosa palustris / Thelypteris palustris var. pubescens* Shrubland (CEGL004656)

NUMBER of PLOTS	6	
AVERAGE RICHNESS	35	
SPECIES	CONSTANCY	AVERAGE COVER CLASS
Morella cerifera	100	6
Mikania scandens	100	3
Toxicodendron radicans var. radicans	83	6
Rosa palustris	83	5
Acer rubrum	83	5
Thelypteris palustris var. pubescens	83	4
Apios americana	83	4
Triadenum walteri	83	2
Smilax laurifolia	83	2
Osmunda regalis var. spectabilis	67	6
Persicaria arifolia	67	4
Hydrocotyle umbellata/verticillata	67	2
Persicaria sagittata	67	2
Cicuta maculata var. maculata	67	2
Cladium jamaicense	50	6
Pontederia cordata var. cordata	50	5
Typha domingensis	50	3
Boehmeria cylindrica	50	3
Iris virginica var. virginica	50	3
Ludwigia alata/decurrens/glandulosa/palustris	50	2
Tillandsia usneoides	50	2
Ipomoea pandurata/sagittata	50	2
Oenothera fruticosa var. fruticosa	50	2
Ptilimnium capillaceum	50	2
Sagittaria lancifolia var. media	50	2
Saururus cernuus	50	2
Persea palustris	33	4
Peltandra virginica	33	4
Panicum hemitomon	33	3
Thalictrum macrostylum	33	3
Carex alata	33	3
Murdannia keisak	33	3
Galium obtusum	33	3
Cornus amomum	33	3

Floristic table for Group IX.A.2: *Iva frutescens / Spartina cynosuroides* Tidal Shrubland (CEGL006847)

NUMBER of PLOTS	1
AVERAGE RICHNESS	29
SPECIES	COVER CLASS
Spartina cynosuroides	8
Sagittaria lancifolia var. media	6
Morella cerifera	5
Thelypteris palustris var. pubescens	5
Baccharis halimifolia	4
Kosteletzkya virginica var. virginica	4
Rosa palustris	4
Typha angustifolia	4
Mikania scandens	3
Toxicodendron radicans var. radicans	3
Typha domingensis	3
Bidens sp.	2
Boehmeria cylindrica	2
Eleocharis obtusa	2
Galium obtusum	2
Galium tinctorium var. floridanum	2
Hibiscus moscheutos ssp. moscheutos	2
Hydrocotyle umbellata/verticillata	2
Iva frutescens	2
Ludwigia Ludwigia alata/decurrens/glandulosa/palustris	2
Lythrum lineare	2
Oenothera fruticosa var. fruticosa	2
Osmunda regalis var. spectabilis	2
Persicaria punctata	2
Persicaria sagittata	2
Phyla lanceolata	2
Ptilimnium capillaceum	2
Solidago sempervirens var. mexicana	2
Ulmus americana var. floridana	2

Floristic table for Group X.A.1: *Cladium mariscus ssp. jamaicense* Tidal Herbaceous Vegetation (CEGL004178)

NUMBER of PLOTS	2	
AVERAGE RICHNESS	11	
SPECIES	CONSTANCY	AVERAGE COVER CLASS
Cladium jamaicense	100	9
Sagittaria lancifolia var. media	100	4
Osmunda regalis var. spectabilis	100	3
Peltandra virginica	100	2
Ludwigia alata/decurrens/glandulosa/palustris	100	1
Baccharis halimifolia	100	1
Mikania scandens	100	1
Hibiscus moscheutos ssp. moscheutos	100	1
Typha domingensis	100	1
Juncus roemerianus	50	4
Tephrosia virginiana	50	3

Floristic table for Group X.A.2: *Juncus roemerianus* Herbaceous Vegetation (CEGL004186)

NUMBER of PLOTS	1
AVERAGE RICHNESS	27
SPECIES	COVER CLASS
Juncus roemerianus	8
Hibiscus moscheutos ssp. palustris	5
Mikania scandens	5
Thelypteris palustris var. pubescens	5
Hydrocotyle umbellata/verticillata	4
Kosteletzkya virginica var. virginica	4
Persicaria sagittata	4
Spartina cynosuroides	4
Ptilimnium capillaceum	3
Solidago sempervirens var. mexicana	3
Baccharis halimifolia	2
Bidens sp.	2
Dichanthelium acuminatum var. acuminatum	2
Dicot sp.	2
Eleocharis obtusa	2
Galium obtusum	2
Galium tinctorium var. floridanum	2
Lobelia elongata/glandulosa	2
Ludwigia Ludwigia alata/decurrens/glandulosa/palustris	2
Ludwigia Ludwigia alata/decurrens/glandulosa/palustris	2
Mikania scandens	2
Osmunda regalis var. spectabilis	2
Rosa palustris	2
Sagittaria lancifolia var. media	2
Samolus parviflorus	2
Toxicodendron radicans var. radicans	2
Typha domingensis	2

Floristic table for Group XI.A.1: *Eleocharis fallax – Eleocharis rostellata – Schoenoplectus americanus – Sagittaria lancifolia* Herbaceous Vegetation (CEGL004628)

NUMBER of PLOTS	4	
AVERAGE RICHNESS	20	
SPECIES	CONSTANCY	AVERAGE COVER CLASS
Sagittaria lancifolia var. media	100	7
Typha domingensis	100	6
Hibiscus moscheutos ssp. moscheutos	100	4
Schoenoplectus americanus	100	4
Hydrocotyle umbellata/verticillata	100	3
Persicaria punctata	100	3
Spartina patens var. patens	75	6
Juncus roemerianus	75	4
Lythrum lineare	75	2
Mikania scandens	75	2
Eleocharis obtusa	50	5
Pontederia cordata var. cordata	50	5
Amaranthus cannabinus	50	2
Baccharis halimifolia	50	2
Cyperus haspan	50	2
Galium obtusum var. filifolium	50	2
Juncus acuminatus	50	2
Phyla lanceolata	50	2
Proserpinaca palustris var. palustris	50	2
Ptilimnium capillaceum	50	2
Spartina cynosuroides	50	2
Eleocharis fallax	25	6
Galium obtusum var. obtusum	25	4
Iris virginica var. virginica	25	2
Morella cerifera	25	2
Osmunda regalis var. spectabilis	25	2
Persicaria sagittata	25	2
Sabatia dodecandra	25	2

Floristic table for Group XI.A.2: *Juncus roemerianus – Pontedaria cordata* Herbaceous Vegetation (CEGL004660)

NUMBER of PLOTS	5	
AVERAGE RICHNESS	22	
SPECIES	CONSTANCY	AVERAGE COVER CLASS
Juncus roemerianus	100	8
Sagittaria lancifolia var. media	100	4
Lythrum lineare	100	2
Solidago sempervirens var. mexicana	80	4
Typha domingensis	80	3
Hydrocotyle umbellata/verticillata	80	2
Ludwigia alata/decurrens/glandulosa/palustris	80	2
Mikania scandens	80	2
Schoenoplectus americanus	80	2
Baccharis halimifolia	60	4
Spartina cynosuroides	60	4
Lobelia elongata/glandulosa	60	2
Persicaria punctata	60	2
Phyla lanceolata	60	2
Spartina patens var. patens	60	2
Typha angustifolia	60	2
Spiranthes odorata/ovalis	60	1
Hibiscus moscheutos ssp. moscheutos	40	4
Cyperus haspan	40	2
Iva frutescens	40	2
Kosteletzkya virginica var. virginica	40	2
Panicum virgatum var. virgatum	40	2
Ptilimnium capillaceum	40	2
Sabatia dodecandra	40	2
Asclepias lanceolata	40	1
Pluchea odorata var. odorata	40	1
Galium obtusum	20	4
Vallisneria americana	20	4
Osmunda regalis var. spectabilis	20	3
Persicaria arifolia	20	3

Floristic table for Group XI.A.3: *Spartina cynosuroides – Panicum virgatum – Phyla lanceolata* Herbaceous Vegetation (CEGL007741)

NUMBER of PLOTS	2	
AVERAGE RICHNESS	20	
SPECIES	CONSTANCY	AVERAGE COVER CLASS
Spartina cynosuroides	100	9
Kosteletzkya virginica var. virginica	100	5
Persicaria sagittata	100	5
Hibiscus moscheutos ssp. moscheutos	100	4
Mikania scandens	100	4
Sagittaria lancifolia var. media	100	4
Hydrocotyle umbellata/verticillata	100	3
Peltandra virginica	100	3
Saccharum giganteum	100	2
Cladium jamaicense	50	5
Amorpha fruticosa	50	4
Carex hyalinolepis	50	3
Galium obtusum var. obtusum	50	3

Floristic table for Group XI.A.4: *Spartina cynosuroides* Herbaceous Vegetation (CEGL004195)

NUMBER of PLOTS	1
AVERAGE RICHNESS	31
SPECIES	COVER CLASS
Typha domingensis	7
Spartina cynosuroides	6
Cladium jamaicense	4
Hibiscus moscheutos ssp. moscheutos	4
Pontederia cordata var. cordata	4
Iris virginica var. virginica	3
Mikania scandens	3
Panicum virgatum var. virgatum	3
Amaranthus cannabinus	2
Boehmeria cylindrica	2
Ceratophyllum sp.	2
Galium obtusum var. filifolium	2
Hydrocotyle umbellata/verticillata	2
Lemna minor	2
Oenothera fruticosa var. fruticosa	2
Osmunda regalis var. spectabilis	2
Peltandra virginica	2
Persicaria arifolia	2
Persicaria sagittata	2
Ptilimnium capillaceum	2
Rhynchospora sp.	2
Rosa palustris	2
Sagittaria latifolia var. latifolia	2
Solidago sempervirens var. mexicana	2
Taxodium distichum	2
Triadenum virginicum	2

Floristic table for Group XI.A.5: *Typha angustifolia – Hibiscus moscheutos* Herbaceous Vegetation (CEGL004201)

NUMBER of PLOTS	4	
AVERAGE RICHNESS	14	
SPECIES	CONSTANCY	AVERAGE COVER CLASS
Hibiscus moscheutos ssp. moscheutos	100	2
Osmunda regalis var. spectabilis	75	6
Typha domingensis	75	6
Cladium jamaicense	50	6
Typha angustifolia	50	6
Schoenoplectus americanus	50	5
Morella cerifera	50	4
Sagittaria lancifolia var. media	50	4
Proserpinaca palustris var. palustris	50	3
Toxicodendron radicans var. radicans	50	3
Acer rubrum	50	2
Ludwigia alata/decurrens/glandulosa/palustris	50	2
Mikania scandens	50	2
Persicaria hydropiperoides	50	2
Persicaria arifolia	50	1
Juncus roemerianus	25	5
Galium obtusum var. filifolium	25	2
Lythrum lineare	25	2
Spartina cynosuroides	25	2

Floristic table for Group XI.A.6: *Schoenoplectus pungens* - (*Osmunda regalis var. spectabilis*) Herbaceous Vegetation (CEGL004189)

NUMBER of PLOTS	1
AVERAGE RICHNESS	19
SPECIES	COVER CLASS
Schoenoplectus americanus	9
Sagittaria lancifolia var. media	8
Eleocharis obtusa	6
Persicaria punctata	6
Hydrocotyle umbellata/verticillata	4
Spartina patens var. patens	4
Leersia virginica	3
Lythrum lineare	3
Galium obtusum var. filifolium	2
Juncus acuminatus	2
Mikania scandens	2
Phyla lanceolata	2
Saccharum giganteum	2